REMARKS

Claim 17 stands rejected under 35 USC 112, second paragraph. Applicant respectfully traverses.

The examiner appears to suggest that the counterpart in FIGS. 1 and 2 of the second composite member of claim 17 is the member 6, 7 on the opposite side of FIGS. 1 and 2 from the first composite member, i.e. that the two composite members are symmetrically disposed with respect to each other. This is incorrect, since claim 17 specifies that the first and second composite members are fastened to the base parts of the ground electrode and the center electrode respectively.

The step of forming the composite blank is described with reference to FIG. 3, which illustrates a surface part 7 and an intermediate part 6, wherein the surface part has been joined to the intermediate part by means of explosion welding. A first composite member (the part 9) is separated from the blank 8 and is attached at its intermediate part 6 to the base part 5 of the ground electrode 2.2 so that a joint is made between the base part of the ground electrode and the intermediate part of the first composite member. A second composite member that comprises a second surface part 7 and an intermediate part 6 to which the second surface part is joined by explosion welding is fastened to the base part 4 of the center electrode 2.1 so that the surface part of the first composite member is in spaced confronting relationship with the surface part of the second composite member.

The second composite member is shown in FIGS. 1 and 2, but since the second composite member shown in FIGS. 1 and 2 has two surface parts 7 at opposite sides, it is apparent that the second composite member has a different structure from the first composite member and is not formed by separating a portion from the blank 8 shown in FIG. 3. Nevertheless, the method defined in claim 17 is supported by the description with reference to the drawings.

In view of the foregoing, applicant submits that claim 17 is definite and requests that the rejection under 35 USC 112, second paragraph should be withdrawn.

Claims 9-15 and 17 stand rejected under 35 USC 103 over Ishiguro et al in view of Yamaguchi et al and claims 9, 14 and 16 stand rejected under 35 USC 103 over Matsutani in view of Yamaguchi et al.

Claims 9-13 have been canceled rendering the rejections of those claims moot.

The subject matter of claim 14 is a method for producing a spark plug having at least two electrodes, in which the electrodes each include at least a base part (corresponding respectively in the case of the embodiment described with reference to FIGS. 1-3 to the substrate 3 and the central rod (not referenced) shown in FIG. 1) made of a substrate material. Each electrode also has a surface part (corresponding to the surface part 7) that is made of a material more durable than the substrate material. The method comprises forming a blank (corresponding to the blank 8 shown in FIG. 3) comprising a surface part (7) and an intermediate part (6) by joining the surface part to the intermediate part by explosion welding. The method further comprises separating part of the blank (the part 9) to form the electrode of the spark plug and fastening the part (9) separated from the blank to the base part (3) of the spark plug so that a joint is made between the base part and the intermediate part. Thus, the part (9) separated from the blank is positioned so that the intermediate part is between the base part of the spark plug and the surface part.

Ishiguro et al shows in FIG. 5 that a spark plug may be made by forcing a noble metal plate 80' onto the central electrode 30 and welding the noble metal plate 80' to the central electrode 30 and to the ends 42 of the earth (ground) electrodes 40. Portions of the noble metal plate 80' are then removed to provide the central electrode chip 50 and the earth electrode chips 60.

The process shown in FIG. 8 of Ishiguro et al is similar except that the earth electrodes 40 are attached to the end 11 of the housing 10 after the noble metal member 100 has been attached to the end 31 of the central electrode 30.

The examiner relies on Yamaguchi et al as disclosing that explosion welding may be used to form a clad plate used in manufacture of a spark plug. As shown by Yamaguchi et al, the clad plate 3 comprises a plate 1 of corrosion resistant metal and a plate 2 of metal having good conductivity. The clad plate 3, which may be formed by explosion welding, is formed into suitable sized and shaped portions 4, such as shown in FIGS. 2 and 3. The portion 4 is inserted in an extrusion die 5 and pressure is applied by means of the

extrusion punch 6 to form a product which comprises a core member 8 surrounded by a covering member 7.

The examiner evidently takes the position that it would have been obvious to a person of ordinary skill in the art to have used the explosion welding process of Yamaguchi et al instead of the laser welding or resistance welding referred to in Ishiguro et al to attach the noble metal plate 80' (or the noble metal member 100) to the central electrode 31 and the ends 42 of the earth electrodes 40.

Referring to FIG. 5 of Ishiguro et al, in order to employ explosion welding to attach the plate 80' to the ends 42 of the earth electrodes 40, it would be necessary to accelerate the plate 80' towards the surface 42 (or to accelerate the member 40 towards the plate 80') so that the plate 80', as a clad plate, strikes the electrode 40, as a base plate (or the electrode 40, as a clad plate, strikes the plate 80', as a base plate) and the impact results in the plate 80' being bonded to the electrode 40 by plastic deformation. The acceleration would have to be in a direction perpendicular to the end surface of the electrode 40. The examiner has not hinted at how this might be accomplished in the structure shown in FIG. 5 of Ishiguro et al. The examiner has merely shown that explosion welding is a known technique and has been used, by Yamaguchi et al, in the fabrication of a spark plug. This is not enough to establish that it would have been feasible, let alone obvious, to employ explosion welding in the method described by Ishiguro et al. Applicant submits, on the contrary, that in the absence of a plausible explanation from the examiner as to how explosion welding might be applied to produce the structure shown in FIG. 5C of Ishiguro et al, or the structure shown in FIG. 8D of Ishiguro et al, it must be concluded that it would not have been obvious to a person of ordinary skill in the art to have used explosion welding.

Matsutani discloses in FIG. 3 a spark plug of which the center electrode is fabricated by forming a recess 43 (FIG. 4), placing a ring 60 of noble metal in the recess, and welding the noble metal to the center electrode to form a noble metal portion 6, shown also in FIG. 3. The description of the method illustrated by FIGS. 3 and 4 does not mention the structure of the ground electrode 1 except to state that it has a firing end 13, but we may assume for the purpose of this discussion, but without conceding, that the ground electrode 1

is made in analogous fashion to the electrode 1 of the spark plug described with reference to FIGS. 1 and 2. In this case, the firing portion 13 of the clad metal 11 is formed by providing a recess in a composite plate 1a, placing a disk of noble metal material in the recess, and welding the noble metal material to the clad metal 11 of the composite plate 1a.

The examiner argues that it would have been obvious in view of Yamaguchi to use explosion welding to weld the metal ring 60 to the central electrode 4 and that the result would have been a method as defined in claim 14. Applicant respectfully disagrees. The examiner has not suggested how explosion welding might be used to attach the ring 60 to the center electrode. For example, there is no reference of record showing how an explosive force might be used to accelerate the ring 60 around its entire circumference, towards the center electrode.

Applicant believes that the examiner considers that it would have been obvious to fabricate the ground electrode 1 of FIG. 1 by using explosion welding to secure the noble metal material 50 to the clad metal 11 of the composite plate 1a.

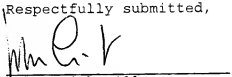
FIG. 1 of Matsutani shows that the ground electrode has a heat conductive core 12 embedded in clad metal 11. FIG. 1 shows that the clad metal 11 surrounds the core 12 and does not suggest that the core 12 is sandwiched between inner and outer layers of clad metal 11. Applicant therefore submits that Matsutani does not disclose or suggest that the ground electrode 1 of FIG. 3 is made by forming a blank comprising a surface part and an intermediate part joined by welding, and separating a part from the blank to form the ground electrode of the spark plug, as asserted by the examiner. Therefore, regardless of whether explosion welding might have been used in manufacturing the ground electrode, the spark plug of Matsutani is not produced by a method as defined in claim 14. The description with reference to FIGS. 3 and 4 of Matsutani does not disclose or suggest the steps of forming a blank comprising a surface part and an intermediate part and separating a part with a suitable form from the blank to form the center electrode of the spark plug.

In view of the foregoing, applicant submits that the subject matter of claim 14 is not disclosed or suggested by Yamaguchi et al, Ishiguro et al and Matsutani, whether taken singly or in combination.

Therefore, claim 14 is patentable and it follows that the dependent claims 15 and 16 also are patentable.

The wording of claim 17 regarding the steps for forming the composite member that is fastened to the base part of the ground electrode, namely forming a composite blank and separating a first composite member from the blank and fastening the first composite member to the base part of the ground electrode, are substantially similar to the corresponding steps of claim 14 and therefore the arguments presented in support of claim 14 are also applicable to claim 17. Therefore, claim 17 is patentable.

Respectfully submitted,



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